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TEACHING THE TOPIC OF PHENOLIC COMPOUNDS IN THE RESISTANCE OF PLANTS TO EXTERNAL FACTORS IN BIOLOGY CLASSES

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Annotation: The step of human civilization towards an informed society requires the study of the future of biology teachers as an urgent problem in preparing them for professional activities in an automated information learning environment. As a result of informatization of education, every teacher and student should have an unlimited source of information.

Keywords: biology, plant, information technology, education, teacher.

Major reforms in the socio-economic life of the country, in turn, have a significant impact on the requirements for graduates of higher education institutions. The higher education institution develops criteria not only for the completeness of certain knowledge and skills, but also for the independent enrichment of their knowledge, setting and solving various problems, offering alternative solutions, selecting the most effective among them in shaping the aspects of the graduate's professional skills in the new environment. should also be directed to the output TB. In the era of modern development, there is such an important issue as preparing the younger generation for life in the information society. At the same time, of course, it is important to form an information culture in each person. The step of human civilization towards an informed society requires the study of the future of biology teachers as an urgent problem in preparing them for professional activities in an automated information learning environment. As a result of informatization of education, every teacher and student should have an unlimited source of information. Analytical processing of information allows to use it in its place and strengthens the activity of the participants of the pedagogical process. Extensive research in the field of informatization of education, as well as the experience of the use of information technology in higher education shows that the content, style, tools, forms of education and methods of control of higher education institutions acquire new didactic conditions and new structure. , performance, scope of work and psychological and pedagogical characteristics. With this in mind, the use of interactive technologies for assessing students' knowledge in the context of informatization of education allows to increase their professional training by activating their cognitive activities.

When learning about plants in biology classes, one of the unique characteristics of plants is their ability to form secondary metabolites that have a phenolic nature during growth and development. Phenolic compounds are common in the plant kingdom and are found in all types of plants in the form of phenolic carboxylic acids, phenylpraponoids, coumarins, quinones, flavonoids, additives, and lignin. The aromatic ring of phenolic compounds contains free hydroxyl groups. Due to these hydroxyl groups, they are highly reactive and participate in the protection of plant cells from various abiotic and biotic stress factors of the external environment (fungal, bacterial and viral diseases, heavy metals, UV rays, drought, salinity, low temperatures, etc.). noted. In particular, ultraviolet light is a powerful stress factor for living organisms as well as plants. Ultraviolet rays alter the morpho-physiological and biochemical properties of plant cells. This change depends on their genotype, the stage of development of the organism and the radiation conditions, ie the spectral composition of the rays and the wavelength. Types of ultraviolet light, such as short-wave UB-S (wavelength 200 to 280), medium-

wave UB-B (wavelength 280 to 315), and long-wave UV-A (wavelength 315 to 380), differ from each other. The effect of rays of different wavelengths on a plant cell is also different, with short-wavelength UV-S rays affecting the DNA in the cell and medium-wavelength UV-B rays affecting most proteins. UB-A, on the other hand, has a mainly phytoregulatory effect and shows changes in the metabolism of plant tissues under the influence of stress. Its high amount leads to damage to living cells [1]. Cooling of the ambient air temperature also has a negative impact on the life activity of plants. A sudden drop in air temperature can lead to changes in metabolism in plants. Substances that protect the plant cell from the cold conditions of the external environment accumulate. This is primarily due to the accumulation of carbohydrates, the formation of stress proteins, an increase in the amount of phospholipids and unsaturated fatty acids in the membrane, and a decrease in the amount of free water in the cell [2]. However, in the process of cold hardening of some plants, it was found that the amount of phenolic compounds in them increases. In particular, the process of cold hardening of the plant Brassica napus L. led to the accumulation of phenolic compounds in their leaves [3]. An increase in the amount of phenolic compounds was also observed in the adaptation of winter wheat to the cold. The amount of free L-phenylalanine, L-phenylalanine-ammonia-lyase activity and the formation of soluble and polymeric (lignin) phenolic compounds were studied during cold hardening of winter wheat [4]. It is known in advance that the resistance of plants to damage under the influence of various pathogenic bacteria, viruses and fungi is associated with an increase in phenolic fungitoxic compounds in their tissues.

The first research in this area was related to the resistance of wheat plants to rust disease, in which it was noted that the amount of polyphenols in plant tissue increased. There are also reports in the literature of changes in phenolic compounds in plants under drought and soil salinity stress. Drought and soil salinity lead to a lack of water and other minerals for plants such as the above. In particular, the lack of water and other minerals in wheat during drought, as well as the accumulation of phenolic compounds in the plant. Changes in phenolic compounds in pea plants under saline conditions have been studied. It was noted that the amount of phenolic compounds in plants increases with increasing salinity. It was also found that the amount of phenolic compounds in different varieties of wheat increased with increasing soil salinity. Thus, plants respond with the formation of more phenolic compounds as a response to the effects of various stressors of the external environment, and it can be assumed that plants are more resistant to stressors. However, in this process, the physiological and biochemical changes of phenolic compounds and the mechanism of their action - 82 Materials of the Republican Scientific-Practical Conference, Tashkent, 2018. May 24-25 is not fully defined. It is of great importance to study the mechanism of action of phenolic compounds on stress factors. Research in this area is still in full swing.

It should be noted that ensuring the reliability and objectivity of control over the acquisition of knowledge is important in solving the problem of improving the quality of acquisition of scientific knowledge and increasing the level of preparation of graduates for professional activities in accordance with labor market requirements.

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